

DOCUMENT RESUME

ED 159 719

CS 204 389

AUTHOR Laque, Carol Feiser
 TITLE Mathematical Designs for Teaching and Learning Composition.
 PUB DATE 78
 NOTE 8p.; Paper presented at the Annual Meeting of the Conference on College Composition and Communication (29th, Denver, Colorado, March 30-April 1, 1978)
 EDRS PRICE MF-\$0.83 HC-\$1.67 Plus Postage.
 DESCRIPTORS Composition (Literary); *Composition Skills (Literary); Creative Teaching; *Mathematical Concepts; *Mathematical Models; *Paragraph Composition; Senior High Schools; *Sentence Structure; Symbols (Mathematics); *Teaching Techniques

ABSTRACT

Algebraic equations and geometric forms are useful in teaching and learning composition. Algebraic equations can illustrate the modular nature of paragraph structures and can be refined by students to describe types of paragraphs. Discussion of the "slippery" nature of words and their power of transformation can be a lecture topic as the class learns to gain control of writing by imposing mathematical order. The use of geometric forms allows students to study both form and the composing process. For instance, given geometric forms representing a room and furniture, and seeing that moving one piece around forces other changes, the student may be sensitized to the furniture of a sentence and discover the interrelationship of its parts. Allowing students to play with algebraic and geometric forms establishes analogies for studying forms in language and for developing creativity and critical skills. However, the movement of geometric forms is generally useful to the entire class while algebra seems useful only to a select group. (TJ)

 * Reproductions supplied by EDRS are the best that can be made *
 * from the original document. *

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

Mathematical Designs for Teaching
and Learning Composition

by Carol Feiser LaQue

"PERMISSION TO REPRODUCE THIS
MATERIAL HAS BEEN GRANTED BY

Carol Feiser LaQue

TO THE EDUCATIONAL RESOURCES
INFORMATION CENTER (ERIC) AND
USERS OF THE ERIC SYSTEM."

The use of mathematical designs provides both teacher and students with analogies for learning to compose and for describing and clarifying the composing process in nonverbal, symbolic terms. Frequently students who are sensitive to order in terms of mathematical constructs are stimulated to create and appreciate order in verbal constructs through analogies. So far I have experimented with some algebraic equations and geometric forms to teach students how to write. Rather than codify and present students with neat solutions or analogies as I would construct them, I have always used mathematical analogies as games encouraging students to invent and create as well as play with ordering language. This presentation, therefore, details a series of verbal and mathematical games as an anthropologist might record them with an eye to record the poetry of student inventions as they use mathematics to describe the ordering of ideas from prewriting stages through to the editing process in both thesis statements and paragraph forms.

The first objective I had in using algebraic equations as an analogy to teach paragraph structure was to illustrate to students the modular nature of paragraph structures. Since I encouraged students to design equations which best described their thesis statements, students struggled with equivalency problems. I did not insist that all students experiment with mathematical equivalents in formulas nor did I encourage them to abandon a good idea which was difficult for them to equate in a model.

First I prepared a gaming lecture where I discussed the symbolic nature of numbers and letters by substituting letters for numbers and discussing student attitudes and expectations of both. By using familiar quotations and substituting numbers for words or by asking students to substitute words for unknown

ED159719

CS 204389

symbols, the entire subject of expectation in form was examined. One example which gave the class special fun and stimulated students to become option oriented was the following. I asked students to list twenty pairs of words to fit where ever I had placed the letter x in the quotation: "Let that person who is without x cast the first x." I utilized the material generated from this brainstorming session to deal with the entire and ongoing nature of judgment and the critical ^{witty} advantage point of the creative writer.

From a simultaneous consideration of paragraph form and thesis statement form we discussed the governing power of thesis statements. By discussing placement of the thesis, I introduced styles of governing power. Students can play with the integral relationship of prewriting and editing as they substitute language for the mathematical equivalents. One student designed the following: $V = ME$. His thesis statement and verbal translation was "Vengeance is mine saith the Lord." Another student who wanted to begin his paragraph with "Nothing will come of nothing" developed $0 \neq 0$. A third example of mathematical punning is illustrated by $V_m = \frac{h}{w}$. The student explained "My van is my home on wheels." To experiment with the symbolic forms in small groups who seem interested is to encourage the development of authority. Some of the visual puns are witty because they are direct equivalents of mathematical values and language values others are poetic in the way they explore unexpected connections.

Students who pursue this frequently utilize algebraic equations and refine them enough to describe types of paragraphs. Rather than provide models for students or teachers to mimic, I would suggest that the teacher who is willing to experiment with this learns that mathematical forms are as mobile as language itself. One student who chose to describe a walk around the park brought in several mathematical designs. He offered the class options to consider. All three got some support from student critics.

Example #1 $\sqrt{P}$	Example #2 $\begin{matrix} w & w & w \\ w & P & w \\ w & & w \\ w & w & \end{matrix}$	Example #3 $\begin{matrix} P \\ w \end{matrix}$
------------------------------	--	--

The delight in hearing him read his paragraph and work out the equations came as he illustrated that even though he wandered in the park on the path returning where he started as though he had completed a full circle, he had actually followed a square path. ^{on route} He arranged the small w's in Example #2 above in both a circular and square manner around the park. His conclusion in his paragraph concerned the loss and found quality of a walk in the park on a warm, spring afternoon.

By allowing students to teach others how their paragraph may be explained in mathematical terms, the teacher can study how a student who is having trouble learns. By using student structured material as an explanation the teacher as well as the class has a shared body of material for establishing discussions of form as well as the construction of the critic's point of view in perception of the forms.

Frequently algebraic equations are obvious to the extent of being direct equivalents. Often with students who become seduced with this game the models require careful articulation to appreciate the relationship between the equation and the written work. This exercise becomes a study which each student will structure based upon her ability level. Advanced students will be interested as well as students who have had trouble learning to write with other approaches. Frequently, the student who feels terrified with the "slippery" nature of words gains control by imposing mathematical order and utilizing mathematical symbols. To satisfy poetic justice the teacher might wish to illustrate the slippery nature of symbols and their powers of transformation. In one instance I had a student capable of advanced gaming who worked on theories of processing. She balanced a series of linear equations as a model and then wrote in the stylistic equivalent about what she did. While this sort of experiment is esoteric, the general idea was of greater help to students who were not as advanced.

Not only does algebra give students a chance to sketch a paragraph short hand and study its order, but also it gives students a quick way to evaluate the progress they are making in both the prewriting and editing process. The verbal and mathematical models give a cross check one with the other. Students may use formulas as an aid or as inspiration during the composing process as a guide. In contrast, I had one student who wrote first and then abstracted a equation during editing as a check for order. Perhaps the greatest benefit of the entire experiment was the lesson for students that any critical perspective contains shared portions and sometimes unique equivalencies. Students certainly gained ideas from one another. Often students were interested in abstracting the ideas which another had written.

The second mathematical analogy proved popular enough for whole class units and involved the use of form and space to teach authority and ordering to writers. Through manipulating geometric forms in a movement experiment, students provided models to study both form and the composing process. I felt that students gained confidence in arranging objects in a familiar space and this transferred well into sentence and paragraph models since I asked students to consider writing in terms of furniture in a room. Geometric forms representing a room and furniture offered students a space in which to move and rearrange units.

To sensitize students to the furniture of a sentence and paragraph, I constructed an analogy using the forms and creating a scenario in which the writer can function as a participant. The story is as follows. The writer is living in a small apartment which has an eat-in kitchen. The round table which the writer has always used has broken and no other round replacement can be found. Consequently a square table of slightly larger size is purchased. Because the sink in on the opposite wall slightly off-center at an oblique angle to the table and because the distance is short, the writer has developed a nasty bruise on the upper

thigh from turning around as usual into the pain of having forgotten to adjust movements to a change of table and living space. I have drawn the room for them and illustrate the scenario in detail for the class.

I then ask students to describe in detail what happens and when and why the writer no longer bumps the table. Students reconstruct the scenario until every group working with the idea agrees on a version for that group. By sketching the scene for them and then retreating far enough for them to solve the problem subtle variations develop. Students consider various adjustments which are made as the writer relates to the distance of objects in space. Some students focus upon the relationship of the writer and the table. Others focus upon the relationship of the writer to the sink pointing out that unless the writer turn around without moving, the writer is, in fact, dealing with the problem of shortening the distance from the body to the wall in front of the kitchen sink since that is the limited vision. Consequently, the incident may be used as an analogy illustrating language as form, as visual picture, as scenario, and as drama at once. Many students begin discussing the way the person turns and discuss movement in turning. Others attempt to rearrange the kitchen furniture. Finally, one group decided to knock down the wall, demanding the blueprints to the entire living space to design a more functional living unit.

This idea became well-liked and useful enough that I encouraged students to describe a room in which they live and to describe the placement of the furniture in the room. Various approaches to the subject develop at once. One student begins with description: "My room is large and bright." The class is quick to ask what room? Another student may approach the ^{Subject} ~~student~~ on an argumentative level: My stereo is the most important piece of furniture in my apartment. Still another student may sequence: "I'll begin with the living room couch and then describe each piece of furniture around the room."

In this way a discussion of the what and how of a paragraph becomes an on going series of structures as they are interrelated. Students can examine the models on an abstracted level once they are sensitive to the literal movement of the models. ^{After} ~~the~~ the students have examined class paragraphs and evaluated how these were done, ^{I make} my third assignment ^{which is} to change the furniture in the room. My directions are generally that vague.

Students discover first what gives them they have assumed. To discover the limits and confines of one's room, arrangements, and ideas is to examine the nature and scope of any given which is discovered to established new-found limits. A student who could not figure how to rearrange the room (the bed only fits on one wall) may be offered solutions by students who see the room from a different angle. In this way students get ideas from one another.

Students enjoy creating options within living space and moving forms around. The step from considering this exercise literally and using it as a language study is a slight one. Students are adept to use this analogy to explain to students what problems a paragraph or a sentence might have. After spending a day working with room models moving shaped items - rectangles for beds and couches, circles for tables, larger circles for chairs etc. students frequently transfer from furniture to sentence parts. Also the notion of changing and moving language or furniture introduces students to the movement and change of ideas. Patterns are redesigned to express new ideas. Finally, students learn how difficult it is ~~to change~~ to change one piece of furniture without moving the others. The relationships of parts and wholes influences the design of the entire room. Finally, to sensitize students to repatterning introduces punctuation.

While this is going on, I frequently give students a piece of e.e. cummings to punctuate and to rewrite. We argue naturally how the change in form influences the meaning of the work. My point is to illustrate to students that punctuation is shorthanded language where symbols mean verbal equivalents such as slow down, or stop. Frequently when this exercise is deadended, (I'll never be able to rearrange the furniture; the room is too small), I encourage students to design ideal rooms or homes. This project becomes a year long

project for some. ⁴ Along the way students develop skills to criticize one another, brainstorm, and encourage the development of writing skills. At least the room/furniture become an analogy for critics who are trying to explain to a writer why they do not understand a passage or what is wrong with it. One student described a writing problem to a fellow student as follows: "Your bad is blocking the door. I can't get into this part right hear." After some analysis about the ending, the critic said, "You have put the door to this idea in the middle of the room." The writer seemed to understand precisely what the critic was telling him. I was, of necessity, taking notes about what they were saying.

Organic to writing/pre-writing/composing is the issue most sensitive to the writing process: when does reclarification become a new idea. This issue is rendered manageable for students by allowing students to play with pure forms. For example, mathematics becomes an objective language when the group agrees upon and shares the knowns and unknowns. Likewise, mathematics becomes a subjective language when it clarifies and establishes new insights or values and renders new unknowns into shared insights. The process of recognizing this comes in moving forms around and seeing how systems work or that they work.

Allowing students to play with forms both geometric and algebraic establishes analogies to study forms in language and to study creation and criticism. Mathematics can become a language for learning language and reflecting general order in the design urge. I should stress that the movement of geometric forms is generally useful to the entire class, whereas the use of algebra seems more useful to a select group. That group may have any ability level.

In conclusion these exercises and analogies become a part of the learning history of the class. It is useful for instructors to recognize that students may provide 80-90 percent of both the material and the direction of the class once the idea catches on. Additionally, once the idea moves grouping the class becomes a factor of how it is functioning. To view mathematical and verbal designs from this perspective is to allow students and their work to create one another.